WHAT IS CLAIMED IS:

1. A color image processing method for converting a first color signal including three variables into a second color signal including N variables, where N is an integer, which is not smaller than four, the color image processing method comprising:

a first conversion of determining (N-3) variables of the second color signal from the first color signal; and

a second conversion of determining the remaining three variables of the second color signal on the basis of the determined (N-3) variables of the second color signal and the first color signal so that the second color signal is colorimetrically equal to the first color signal.

2. The color image processing method according to claim 1, wherein:

the second conversion includes solving a function of the second color signal, which indicates a relation between the second color signal and a device-independent color signal on color system coordinates corresponding to the second color signal, with using the first color signal and the determined (N-3) variables of the second color signal as an input.

3. The color image processing method according to claim

1, wherein:

the N variables of the second color signal includes:

four variables indicating yellow, magenta, cyan, and black; and

at least one of three variables indicating red, green, and blue.

4. The color image processing method according to claim 1, wherein:

the (N-3) variables of the second color signal determined in the first conversion include:

a variable indicating black; and

at least two of four variables indicating red, green, and blue; and

the three variables determined in the second conversion include three variables indicating yellow, magenta, and cyan.

5. The color image processing method according to claim 1,wherein:

the first conversion includes:

determining a UCR ratio concerning the (N-3) variables of the second color signal on the basis of the first color signal;

determining maximum and minimum values of each of (N-3) variables of the second color signal, which

is inputtable in a color gamut, on the basis of the first color signal; and

determining the (N-3) variables of the second color signal to be between the maximum and minimum values on the basis of the UCR ratio concerning the (N-3) variables of the second color signal and the maximum and minimum values.

6. The color image processing method according to claim 1, wherein:

the first conversion includes:

determining a UCR ratio concerning an achromatic component, a UCR ratio concerning a chromatic component, and three primary color signals, which represent the first color signal, on the basis of the first color signal; and

performing a UCR processing on the basis of the achromatic component and a UCR ration concerning a chromatic ration to eliminate the achromatic component and the chromatic component from the three primary color signals, to thereby determine the (N-3) variables of the second color signal.

7. The color image processing method according to claim 6, wherein the three primary color signals indicate yellow,

magenta, and cyan.

8. The color image processing method according to claim 1, wherein the first color signal is an L*a*b* color signal.

9. A color image processing apparatus for converting a first color signal including three variables into a second color signal including N variables, where N is an integer, which is not smaller than four, the color image processing apparatus comprising:

a first conversion unit for determining (N-3) variables of the second color signal from the first color signal; and

a second conversion unit for determining the remaining three variables of the second color signal on the basis of the determined (N-3) variables of the second color signal and the first color signal so that the second color signal is colorimetrically equal to the first color signal.

10. The color image processing method according to claim 9, wherein:

the second conversion unit solves a function of the second color signal, which indicates a relation between the second color signal and a device-independent color signal on color system coordinates corresponding to the second color signal, using the first color signal and the determined (N-3) variables

of the second color signal as an input.

11. The color image processing apparatus according to claim 9, wherein:

the N variables of the second color signal includes:

four variables indicating yellow, magenta, cyan, and black; and

at least one of three variables indicating red, green, and blue.

12. The color image processing apparatus according to claim 9, wherein:

the (N-3) variables of the second color signal determined by the first conversion unit includes:

a variable indicating black; and

at least two of four variables indicating red, green, and blue; and

the three variables determined by the second conversion unit includes three variables indicating yellow, magenta, and cyan.

13. The color image processing apparatus according to claim 9,wherein:

the first conversion unit:

determines a UCR ratio concerning the (N-3)

variables of the second color signal on the basis of the first color signal;

determines maximum and minimum values of each of (N-3) variables of the second color signal, which is inputtable in a color gamut, on the basis of the first color signal; and

determines the (N-3) variables of the second color signal to be between the maximum and minimum values on the basis of the UCR ratio concerning the (N-3) variables of the second color signal and the maximum and minimum values.

14. The color image processing apparatus according to claim 9, wherein:

the first conversion unit:

determines a UCR ratio concerning an achromatic component, a UCR ratio concerning a chromatic component, and three primary color signals, which represent the first color signal, on the basis of the first color signal; and

performs a UCR processing on the basis of the achromatic component and a UCR ration concerning a chromatic ration to eliminate the achromatic component and the chromatic component from the three primary color signals, to thereby determine the (N-3) variables of

the second color signal.

15. The color image processing apparatus according to claim 14, wherein the three primary color signals indicate yellow, magenta, and cyan.

16. The color image processing apparatus according to claim 9, wherein the first color signal is an L*a*b* color signal.

17. A method for producing a direct look-up table used in converting a first color signal including three variables into a second color signal including N variables, where N is an integer, which is not smaller than four, the method comprising:

preparing a plurality of first color signals;

determining (N-3) variables of each of second color signals from each of first color signals;

determining the remaining three variables of each of second color signals on the basis of the determined (N-3) variables of each of second color signals and each of first color signals so that each of second color signals is colorimetrically equal to each of first color signals; and

forming the direct look-up table using pairs of the first color signals and the determined second color signals.

18. A color image processing program causing a computer to perform a process for converting a first color signal including three variables into a second color signal including N variables, where N is an integer, which is not smaller than four, the process comprising:

a first conversion of determining (N-3) variables of the second color signal from the first color signal; and

a second conversion of determining the remaining three variables of the second color signal on the basis of the determined (N-3) variables of the second color signal and the first color signal so that the second color signal is colorimetrically equal to the first color signal.

19. A computer-readable recording medium storing a color image processing program causing a computer to perform a process for converting a first color signal including three variables into a second color signal including N variables, where N is an integer, which is not smaller than four, the process comprising:

a first conversion of determining (N-3) variables of the second color signal from the first color signal; and

a second conversion of determining the remaining three variables of the second color signal on the basis of the determined (N-3) variables of the second color signal and the first color signal so that the second color signal is

colorimetrically equal to the first color signal.